

of the green variety, and marked over the whole surface with lines that present very much the appearance of Chinese characters; it resembles, however, specimens of the eggs of *Uria troille*, and I see no character by which it could be distinguished from them.

Naumann gives, as one of the distinguishing features of the eggs of this bird, a peculiarly fine spotting or dotting, which gives the whole egg, at a short distance, the appearance of being uniformly dark colored. I saw no eggs at Gannet Rock that presented this peculiarity, but in the collection of the Smithsonian Institution there are eggs from California of another species, which are so marked. The species to which these eggs belong is as yet doubtful. Among the thousands of eggs of *U. troille* seen by me at Labrador, not one presented this peculiarity.

Four eggs measured: 79 x 47 mill. — 75 x 48 — 70 x 46 — 80 x 50.

*Uria lomvia*,\* Linn. Every available spot on the sides of Gannet Rock, not already occupied by the Gannets or Kittiwakes, had been taken possession of by the three last-mentioned species of Guillemots and the Razor-billed Auks; their comparative numbers were about three of *U. troille* to two of *U. lomvia* and one of *U. ringvia*, and about one Auk to fifty Guillemots. I noticed nothing in the habits of these birds not already well known.

According to Naumann, the eggs of *U. lomvia* resemble a turkey's in form; though their shape is generally more ovate than that of the two preceding species, and the spots are frequently larger and less numerous, I have not been able to find any character by which they can certainly be distinguished. I have eggs, particularly of *U. ringvia*, that present these peculiarities as strikingly as any of the present species.

Four specimens measured as follows: 79 x 47 mill. — 75 x 48 — 70 x 48 — 70 x 45.

Mr. Theodore Lyman presented the following:—

#### DESCRIPTIONS OF NEW OPHIURIDÆ.

##### † OPHIOPLOCUS, Lyman. (Nov. Gen.)

Disc closely and finely scaled, above and below. Genital scales hidden. Teeth. No tooth-papillæ. Mouth-papillæ. Side mouth-shields wide, and nearly, or quite, meeting within. Arm-spines arranged along the outer edge of the side arm-plates. Upper arm-

\*This is the specific name given by Linnæus to Brünnich's Guillemot in the "Systema Nature," edit. x. 1758, and consequently has priority over *arra* of Pallas.

† "Οφις, snake; πλόκος, a twisted rope.

plates divided, on the middle line, into halves, which, at the base of the arm, are placed at the outer lower corner of the joint, on each side, being separated by a number of supplementary pieces. At the tip of the arm the plate is simple; then it divides in two, and the halves are gradually forced apart by the intrusion of supplementary pieces. Two short genital slits, extending only half-way to the margin of the disc, and beginning outside the mouth-shields.\*

OPHIOPLOCUS TESSELLATUS, Lyman.

*Special marks.* Color gray, with obscure cross-bands on the arms. Length of arms, in adults, four to five and a half times the diameter of the disc.

*Description of a specimen.* Diameter of disc 17 millim. Width of arm, without spines, 3.5 millim. Length of arm 70 millim. Mouth-papillæ five on each side, and one odd one, placed just under the teeth; the side papillæ squarish, flat, and crowded; the odd one resembling the teeth. Teeth five, thick, short, stout, broader than long, with a curved cutting edge. Mouth-shields broad heart-shape, with a curve without and an angle within; length to breadth, 1: 1.5. Side mouth-shields large and of even width, 5 millim. wide. Under arm-plates squarish, very regular and clear in outline, slightly separated, thick; outer side curved, lateral sides a little re-enteringly curved; length to breadth (10th plate) 1: 1.3. The halves of the upper arm-plates are rounded triangular, very much like the supplementary pieces in *Ophionereis*; at the base of the arm they lie very low down, so that the side arm-plates are much reduced in size; they are separated from each other by six supplementary pieces, of which one lies on the middle line of the arm, and the other five make a sort of semicircle round it; at the base of the arm the central piece of this semicircle becomes very small indeed, and is often divided in two; between the supplementary pieces there are sometimes single large grains. The halves of the upper arm-plates and the supplementary pieces are thick and swelled, and often of about the same size. Side arm-plates small and almost covered up by the arm-spines. Scales of the disc a little larger above than below, mostly overlapping, but with here and there a round scale; varying somewhat in size, the largest 8 millim. long. Radial shields very small, about 1 millim. long, sunken in the scaling of the disc. Genital slits only 2 millim. long, starting 1 millim. outside the mouth-shield. Arm-spines three, stout, round, blunt; the lowest much the largest; lengths, to that of under arm-plate, .8, 1, 1.3; 1. Tentacle-scales two, longer than broad, flat, nearly oval. Color, in alcohol, gray, with

\* *Ophiopsis imbricata* doubtless belongs to this genus, and may be considered the type.

very obscure cross-bars of darker on the arms. According to a colored sketch by Mr. Garrett, the tints of the living animal are about the same.

*Variations.* The characters of fifteen specimens which I have examined were very uniform; only the young have shorter arms. The proportions of the disc to the arms in specimens of different sizes were 9.5:30; 16:68; and 19:93. The radial shields vary a little in size and distinctness.

This species seems, from descriptions, to be very near *Ophiolepis imbricata*; it, however, has the arms a good deal longer, to which may be added the different pattern of color. *O. imbricata* has arms only three times the diameter of the disc.

#### OPHIOLEPIS GARRETTI, Lyman.

*Special marks.* Arms six times the diameter of the disc; not tapering till just at the end. Mouth-shields as broad as long.

*Description of a specimen.* Diameter of disc 9 millim. Width of arm, without spines, 2 millim. Length of arm 55 millim. Mouth-papillæ five on each side, and one under the teeth, those on the sides flat, stout, squarish, crowded; the outer one sends a slender prolongation above and beside the next papillæ. Teeth regular, broader than long, with a rounded cutting edge. Mouth-shields neatly rounded without, and with an acute angle within, length to breadth .9:1; their outer edge is bordered by a line of little, crowded, angular pieces, one of which is inserted between the mouth-shield and side mouth-shield, at each corner. Side mouth-shields large, of equal width along their length; within separated by one or two supplementary pieces. Under arm-plates longer than broad, broader without than within; outer side curved, lateral sides re-enteringly curved; length to breadth, (7th plate) .9:.7. Side arm-plates thick and swelled. Upper arm-plates broader than long, broader without than within; swelled, length to breadth (19th plate) .5:1.3. The supplementary pieces are small and crowded, the one at each outer corner being largest; they are at the base of the arm, from 7 to 10. The scaling of the disc is very regular, the scales being a little smaller below than above; diameter of the largest nearly 1 millim.; each has its free edge bordered by a line of crowded and regular pieces, which are commonly about seven in number. Radial shields irregular oval, separated by two large scales one outside the other, and two smaller ones lying side by side. Arm-spines 4; very small and slender, confined to the middle of the edge of the side arm-plate; lowest one longest, 5 millim. long. Tentacle scales two, rarely three, stout, thick, forming together an oval figure, which stands obliquely to the length of the arm. Color, in alcohol, disc pale reddish-yellow, with bands of darker on the arms, below grayish. The living animal has a brick-red disc

with paler bands on the arms; the lower surface much paler (Garrett).

This species is distinguished from *O. cincta* by shorter mouth-shields and much longer arms.

#### OPHIOCOMA TARTAREA, Lyman.

*Ophiocoma erinaceus* (pars ?) Ltk. Addit. ad Hist. Oph. 164.

*Special marks.* Black. Arms about five and a half times as long as diameter of disc. Upper spines slender and much longer than the rest; sometimes four and a half times as long as an under arm-plate. Two tentacle scales. Interbrachial spaces below not granulated.

*Description of a specimen.* Diameter of disc 25 millim. Breadth of arm without spines 4 millim. Length of arm 132 millim. Tooth-papillæ fourteen to eighteen, sometimes in transverse rows of three; sometimes irregularly placed. Teeth stout, thickened, four in number. Mouth-shields longer than broad, broader without than within, corners all rounded; outer side curved, or made up of three lines; lateral sides re-enteringly curved; length to breadth 3.3 : 2.8. Side mouth-shields triangular, small, broad, lying entirely on the sides of the mouth-shields. Under arm-plates considerably broader than long; a little way from the disc, regularly hexagonal; length to breadth (14th plate) 1.9 : 2.5. Upper arm-plates broader than long, somewhat affected in shape by the number of arm-spines; most are either hexagonal or oval hexagonal, with very sharp lateral corners; length to breadth (13th plate) 1.9 : 4.2. Disc very regularly and finely granulated above, about 14 to a square millim.; below interbrachial spaces naked, showing the fine scales. Arm-spines near base of arm alternating five and four, rarely six; further out four and three; at the tip of the arm only three; upper spine very long, slender, cylindrical, slightly tapering, sometimes a little curved; other spines smaller; within the disc the lowest spine is often much flattened and widened at its end; lengths to that of under arm-plate 9, 6.8, 5.5, 5.5, 3.5, 3.5 : 1.9. Tentacle scales two, nearly to the tip of the arm; outside one oval, inside one more or less irregular. Color, in alcohol, black; the under surface of the arms having a brownish shade.

*Variations.* This species presents some differences in the lengths of the arm-spines, but very little in their *character*. The range of variation is very much as in *O. Busei*. The specimen above described had spines of the maximum length. Another large specimen, with a disc of 27 millim. and arms of 150 millim., had the spines as follows : 6, 5.5, 4, 3.3, 2.7. The spines of another were, 5.8, 4.5, 3.5, 2.8, 2.5; the disc being 22 millim. A partly grown specimen from Kingsmill Island belonged apparently to this species; the disc was 20 millim. in diameter, and the spines were 5, 3, 2.6, 2.6, 2.6.

This seems to be the species described by Dr. Lütken as identical

with *O. erinaceus*. I have seen, however, a number of large specimens of *O. erinaceus*, from Zanzibar, and have compared them with the present species; and they seem to be distinct, differing as "representative species" usually do. The upper arm-spines of *O. erinaceus* are more regular, stouter, and more swelled at the base; also they are shorter; the upper arm-plates are narrower and more crowded; and the arms shorter. A specimen with a disc of 30 millim. had four arm-spines, as follows: 4.6, 4, 3.5, 3.5. Sandwich Islands.

#### OPHIOCOMA MOLARIS, Lyman.

*Special marks.* Arms five and a half to eight times the diameter of the disc. Spines ringed with darker and lighter; upper one slender, little tapering, longest, from three to three and a half times as long as an under arm-plate.

*Description of a specimen.* Diameter of disc, 24 millim. Width of arm without spines, 4 millim. Length of arm, 137 millim. Mouth-papillæ, 11 or 12, the innermost two much the smallest. Tooth-papillæ, 7 or 8, rather large. Teeth, four, upper one narrowest and sharpest. Mouth-shields longer than broad, much narrower within than without, pretty regular; bounded without by a curve, within and on the sides by straight lines; length to breadth, 2.6:2. Side mouth-shields small, triangular, lying on the sides of the mouth-shields. Under arm-plates rather broader than long, hexagonal, the outer side and outer laterals being more conspicuous than the corresponding sides within; length to breadth (10th plate), 1.5:2. Upper arm-plates broader than long, quite irregular, varying in breadth according to the encroachment of the upper arm-spines, oval, with pointed lateral corners; length to breadth (7th plate), 1.5:3.4. Disc regularly, but rather loosely granulated, 20 to a square millim.; below, interbrachial spaces granulated, except a band along each genital slit. Arm-spines near base of arm, alternating four and three, slender, elegant, little tapering, somewhat flattened; upper one longest and largest, but never *swelled*; lengths to that of under arm-plate, 5.5, 3.5, 2.5, 2:1.5. Tentacle scales two, on base of arm, but, a little way out, only one. Color, in alcohol; above, umber brown; below, interbrachial spaces the same, the other parts lighter; some of the arm-spines ringed with lighter.

*Variations.* The arms are always slender, long, and finely tapering; but their proportions vary from five and a half to eight times the diameter of the disc. The tooth-papillæ are commonly about nine; rarely 12. The color varies in depth; the lightest specimens are pale bluish-gray, varied with specks and marblings of white; below, nearly white, with brown lines round the under arm-plates. The lighter the color, the more conspicuous are the dark rings round the spines. The number of joints furnished with two tentacle scales

varies somewhat, often differing on the different arms of the same individual. A specimen with a disc of 23 millim. had arms of 161 millim.; length of arm-spines to under arm-plate, 4.5, 4, 3, 2.5: 1.4. A small specimen had the disc 14 millim.; arms, 110; arm-spines to under arm-plate, 4, 2.5, 2, 1.6: 1.1.

This is the representative species of *O. scolopendrina*, from which, however, it is distinguished by longer arms and longer and more slender arm-spines. The tooth-papillæ, also, are usually fewer. Kingsmill Islands.

#### OPHIOCOMA INSULARIA, Lyman.

*Special marks.* Lower spines longer than the upper. Arms flat, about four times as long as diameter of disc. Under arm-plates regular, and about as long as broad. Interbranchial spaces below closely granulated.

*Description of a specimen.* Diameter of disc 30 millim. Width of arm, without spines, 4.5 millim. Length of arm, 125 millim. Mouth-papillæ, six on each side; under the teeth there cannot be said to be any mouth-papillæ, because the tooth-papillæ, which sometimes are as many as twenty, extend downwards and outwards, growing smaller and smaller, till they nearly reach the inner end of the mouth-shield. Teeth four, flat and squarish; upper one smallest. Mouth-shields about as long as broad, much rounded, without straight lines; length to breadth, 2.8: 2.5. Side mouth-shields small, triangular, lying entirely on the sides of the mouth-shields. Under arm-plates about as broad as long, bounded without by a curve, and within by a short inner side and two inner laterals; length to breadth (15th plate), 2.2. Upper arm-plates even and regular, much broader than long, bounded without by a clean curve, and within by an inner side and two inner laterals; length to breadth, 2: 4. Granulation of the disc extremely close and fine above and below; and extending even to the outer corner of the side mouth-shields; about 45 to a square millim. Arm-spines rather short, little tapering, blunt, a good deal compressed; on the first few joints, beyond the disc, four, very rarely indeed five, further out three; they do not alternate three and four, as is seen in many other species; lengths, to that of under arm-plate, 3, 3.1, 3.6, 3.5: 2. Tentacle scales, two, large and regular, much longer than broad. Color, in alcohol, above, deep umber, almost black; below, interbranchial spaces the same; arms a little lighter.

*Variations.* A young specimen, with a disc of 9.5 millim. had arms 35 millim. long; the mouth-shields were narrower than in the adult, the color was paler, and the tips of the arms were cross-barred with white. A very large specimen with a disc 33 millim. in diameter, had arms 155 millim. long; the proportion of the arm-spines to the under arm-plate was 3.5, 3.5, 3.7, 3.7: 2; the upper spines were greatly

flattened, and were cut square off at the end. Some well-grown individuals have cross-bars of light brown towards the end of the arm. Sandwich Islands, Kingsmill Islands.

### OPHIOCOMA SANNIO, Lyman.

*Special marks.* Arms to disc as four to one; they are banded with yellowish. Six arm-spines, slender, and elegant; upper ones longest, and as long as three and a half to four and a half under arm-plates.

*Description of a specimen.* Diameter of disc 27 millim. Width of arm, without spines, 4 millim. Length of arm about 90 millim. Mouth-papillæ, six, three on each side. Tooth-papillæ irregularly placed, extending nearly to the inner end of the mouth-shield, the lowest one smallest; about twenty-one in number. Teeth five, lowest one very small and nearly surrounded by papillæ; upper one small and somewhat pointed. Mouth-shields oval, longer than broad; length to breadth 2.5:2. Under arm-plates broader than long, regular, bounded without and within by a curve, on the sides by re-entering curves; length to breadth (10th plate) 1.4:2. Upper arm-plates very regular, bounded without by a clean curve, nearly oval, but flattened a little within; length to breadth (10th plate), 1.4:2.4. Disc, above and on the sides, finely and closely granulated, about 45 grains to a square millim., brachial spaces below naked; showing unusually large scales, having a diameter of 5 millim. Arm-spines six, remarkably slender, tapering, and regular; lengths to that of under arm-plate, 5.2, 6, 5, 4.2, 3.8, 3.2:1.4. Tentacle-scales two, rather large and pointed. Color, in alcohol, above, very dark purplish brown; the disc ornamented with numerous fine radiating lines of yellowish; two yellowish specks at the base of each arm; about every other upper arm-plate is cross-barred with yellowish, the base of the upper spine having the same color; below, interbrachial spaces dark brown, varied with yellowish; yellowish spots between the under arm-plates.

*Variations.* The arrangement of colors on the disc varies; sometime the disc is wholly dark, or, again, only spotted with light yellowish; but the arms are always more or less banded with light. A light mark on each side of the mouth-shield is very characteristic. A young specimen with a disc of 9 millim. had arms 34 millim. long; there were five arm-spines. Another had four, and close to the disc, five arm-spines, the disc was to the arms as 6:21. In younger specimens the tooth-papillæ are, of course, fewer.

This species stands very near *O. lineolata*, from Isle de France, but differs in having unequal and longer spines. Sandwich Islands, Kingsmill Islands.

## OPHIOTHRIX VIRGATA, Lyman.

*Special marks.* Disc beset with slender spines. Arms twelve times as long as the diameter of the disc; along their upper side, a clear white line, bordered by a narrow blue one on each side.

*Description of a specimen.* Diameter of disc, 6 millim. Width of arm, without spines, 1 millim. Length of arm, 75 millim. Tooth-papillæ 13, in horizontal rows of two or three; lowest ones the smallest. Teeth four, very thick and stout, standing close together. Mouth-shields heart-shaped, with a pretty distinct point inward, broader than long; length to breadth, .8:1. Side mouth-shields meeting nearly, or quite, within. Under arm-plates four-sided, with cleanly rounded corners; length to breadth (12th plate), .6:.7. Upper arm-plates, wider without than within, outer side cleanly curved, lateral sides a little re-enteringly curved and sloping towards the centre of the arm; length to breadth (8th plate), .7:1. Disc above and below pretty closely covered with short, tapering, thorny spines, the longest 1 millim. in length, which nearly obscure the scaling of the disc, which may be distinguished through the skin. Radial shields nearly naked, separated by a single line of spiny scales; length to breadth, 1.8:1.2. Arm-spines six, slender, not swelled at the point, upper one commonly longest; lengths to that of under arm-plate, 1.7, 1.7, 1.4, .9, .6, .5:.6. Tentacle-scales very distinct, round. Color, in alcohol, above, pale blue on the disc; the radial shields with a speck of white at their outer ends; arms obscurely banded with paler and darker blue; along the middle of the arm a clear line of white bounded by a narrow blue line on each side; below, interbrachial spaces pale blue; the rest nearly white.

*Ophiotrix spongicola* must be quite near this species, but its arms are much shorter, and the pattern of color different. Kingsmill Islands.

## OPHIOTHRIX DEMESSA, Lyman.

*Special marks.* Upper surface of disc, with radial shields closely covered with minute spines, bearing a crown of thorns. Arms about nine times as long as the diameter of the disc. Little thorny spines on the upper arm-plates.

*Description of a specimen.* Diameter of disc, 10.5 millim. Width of arm, without spines, 1.9 millim. Length of arm, 97 millim. Tooth-papillæ fifteen, unusually stout, standing on a level with each other, arranged in horizontal rows of from two to four, according to size; upper ones stoutest. Teeth four, thick, stout, standing well apart. Mouth-shields much broader than long, oval, with a faint point inward; length to breadth, .7:1.1. Side mouth-shields very small and narrow; not meeting within. Under arm-plates small, squarish, with rounded corners, rather broader without than within;

length to breadth, .6 : .6. Upper arm-plates regular and well marked, much wider than long, wider without than within, lateral corners unusually sharp; outer side cleanly curved; length to breadth, .6 : 1.2: their surface is closely covered with minute thorny spines, like those of the disc, but smaller. Disc closely beset with short minute spines, which are smooth on the sides, but have a crown of four to six thorns; the radial shields also are covered so as to look like the rest of the disc; below, the spines are smaller, more scattered, and more pointed. Arm-spines very slender and elegant, tapering, pointed, uppermost and lowest ones shortest; on the basal joints, commonly eleven; lengths to that of under arm-plate, .6, 1, 1.4, 1.6, 1.6, 1.6, 1.6, 1.2, .9, .6, .3 : .6. Tentacle-scale small and rounded. Color, in alcohol, above, faint purplish-blue, arms banded with darker and a broken stripe of the same running along the middle line; interbrachial spaces below, same as above, the rest lighter.

*Variations.* In specimens that have the disc spines less closely set, the disc is seen to be covered with thin, small, rounded scales; the outlines of the radial shields, also, may be seen. The upper arm-plates are hexagonal, having the outer side in three lines. The arms in some specimens attain a length twelve times that of the disc diameter.

*Ophiothrix demessa* has a very soft puffed disc, which commonly wrinkles in alcohol; it somewhat resembles *O. longipeda* and *O. parasita*, but has little thorny spines on the upper arm-plates, and is otherwise distinguished. Sandwich Islands, Kingsmill Islands.

#### OPHIOTHRIX PROPINQUA, Lyman.

*Special marks.* Disc sparsely granulated and covered above with narrow scales, which form five to seven radiating rows in the interbrachial spaces. Radial shields naked.

*Description of a specimen.* Diameter of disc 11 millim. Width of arm, without spines, 1.6 millim. Length of arm, 125 millim. Tooth-papillæ standing nearly on a level with each other; thirteen to fifteen, in horizontal rows of two, or more commonly three; the lowest one smallest. Teeth four, very thick and stout, the highest one smallest. Mouth-shields small, irregular oval, or oval heart-shaped, broader than long; length to breadth .7 : 1.2. Side mouth-shields short and wide, not meeting within. Under arm-plates oval, broader than long, the outer side a little re-enteringly curved; length to breadth (12th plate) .6 : .8. Upper arm-plates pointed oval; much broader than long; length to breadth, .6 : 1.5. Disc covered above with narrow, elongated, rather indistinct scales; arranged in parallel, radiating rows; from five to seven such rows in each interbrachial space; and a single row, of three or four scales between each pair of radial shields; these scales bear a few rough grains; outside each

radial shield, a row of roundish scales; interbrachial spaces below covered with very short spines. Radial shields smaller than usual; regular triangular, quite naked; length to breadth, 2.8 : 1.6. Arm-spines, near base of arm, from five to seven; the two or three lowest very small; the larger ones swelled at the tip; lengths to that of under arm-plate, 2.2, 2.5, 2.2, 1.1, .6 : .6. Tentacle-scale very small, somewhat pointed. Color, in alcohol, above, disc bright Prussian blue, varied with whitish; outer tips of radial shields white; arms obscurely banded with paler and darker blue; a longitudinal stripe of dark-blue along the middle, and a small white spot between each pair of upper arm-plates; below, interbrachial spaces dark-blue; mouth parts and under arm-plates nearly white.

*Variations.* Another specimen had the disc of a more intense blue, and the white spots on the arms were nearly wanting.

This species approaches *O. nereidina*, but has more rows of scales on the back of the disc; the arms, also, are proportionately shorter. Kingsmill Islands.

#### OPHIOTHRIX CHENEYI, Lyman.

*Special marks.* Radial shields closely granulated; disc beset with thorny stumps. Length of arms about eight times the diameter of disc.

*Description of a specimen.* Diameter of disc 21 millim. Width of arm, without spines, 3.6 millim. Length of arm, 170 millim. Tooth-papillæ very close set; they form, as usual, a vertical oval, bordered by a projecting margin of about twenty-six papillæ, the centre being filled in with smaller and lower papillæ. Teeth, two. Mouth-shields nearly as long as broad, heart-shaped with a pretty acute point inward; length to breadth, 2.3 : 2.5. Side mouth-shields somewhat variable, more or less closely soldered to the mouth-shields. Under arm-plates partly separated by transverse furrows; rectangular, broader than long, re-enteringly curved outside; length to breadth (10th plate), 1 : 1.3. Upper arm-plates much broader than long, oval, well-marked, with a distinct longitudinal rib, sometimes a dent in the outer side; length to breadth (12th plate), 1.1 : 2.8. Disc above, closely beset with little stumps, thorny on their tops and sides; the longest of them 5 millim. long. Below, interbrachial spaces with scattered stumps, which near the mouth-shields are more pointed and fewer. Radial shields indistinct, from being covered with large, rough grains, about 35 to a square millim. Arm-spines 9; the 3d, 4th, and 5th, longest, pretty stout, somewhat thickened at the point; the three under ones very small, as also the upper one, which is not always found; lengths to that of under arm-plate, .5, 2.9, 3, 3.1, 3.1, 2, 1.5, 1.2, .5 : 1.2. Tentacle-scales, oval; small but distinct. Color, in alcohol, above, disc rich Prussian blue, speckled with white; a

light spot on each radial shield; arms indistinctly banded with darker and lighter blue; along the middle a fine white line, bordered on each side with a band of blue; below, disc pale blue, arms mottled and speckled with dark and light blue; arm-spines transparent, nearly white; the points of the larger ones brownish.

*Ophiothrix Cheneyi* stands near *O. longipeda*, but has arms only about half as long. It is distinguished by its large size and its broad flat arms, bearing regular and well-marked upper arm-plates. Zanzibar.

#### ASTROPHYTON CLAVATUM, Lyman.

*Special marks.* Radial ribs closely beset with minute, thorny stumps, or spines.

*Description of a specimen.* Diameter of disc 30 millim. Width of arm at first fork, 12 millim. Length of arm, 231 millim.

1st joint (within the disc) to	2d	.	.	8 millim.
2d joint	.	.	to 3d	12 "
3d joint	.	.	to 4th	8 "
4th joint	.	.	to 5th	9 "
5th joint	.	.	to 6th	11 "
6th joint	.	.	to 7th	11 "
7th joint	.	.	to 8th	9 "
8th joint	.	.	to 9th	10 "
9th joint	.	.	to 10th	12 "
10th joint	.	.	to 11th	10 "
11th joint	.	.	to 12th	11 "
12th joint	.	.	to 13th	11 "
13th joint	.	.	to 14th	11 "
14th joint	.	.	to 15th	7 "
15th joint	.	.	to 16th	9 "
16th joint	.	.	to 17th	9 "
17th joint	.	.	to 18th	9 "
18th joint	.	.	to 19th	8 "
19th joint	.	.	to 20th	8 "
20th joint	.	.	to 21st	8 "
21st joint	.	.	to 22d	6 "
22d joint	.	.	to 23d	9 "
23d joint	.	.	to 24th	5 "
24th joint	.	.	to 25th	8 "
25th joint	.	.	to 26th	5 "
26th joint	.	.	to 27th	5 "
27th joint	.	.	to 28th	5 "
28th joint	.	.	to end	5 "

Tooth-papillæ and teeth about thirteen, regular, cylindrical, tapering, sharp, the upper ones largest; the longest 1.5 millim. Mouth-

papillæ about four on each side, very small, somewhat irregular. Madreporic shield lying at the corner of the interbrachial space; broader than long, plainly made up of irregular, short, thickened tubes, soldered side by side. The space occupied by the tentacle pores and the covered under arm-plates is sunken, forming a shallow trench, the joints being indicated by obscure cross lines. Beyond the disc, the joints are marked by depressions between them; their outer and inner ends are thickened on the sides, making a series of very distinct double ridges along the sides of the arm. The under side of the arm, within and near the disc, is covered by a close pavement of flattened grains; it is very distinct from the sides and upper surface, which are beset with fine, rounded grains, and are separated from the lower surface by a sunken line. Along the upper surface of the arm runs a distinct median furrow. Radial ribs running quite to the centre of the disc, prominent, their outer ends cut abruptly off, making a concave sear, length to breadth, 17:4; they are closely beset with microscopic, thorny stumps or grains, some of which end in three or four distinct thorns. The same thorny grains are found, but smaller and more scattered, on the interbrachial spaces below; and a few also on the depressed parts of the upper surface of the disc. At the tips of the arms and on the smaller twigs there are, as usual, double vertical rows of grains, bearing hooks. Tentacle-scales, one or two, small and difficult to see, extending inward as far only as the fourth fork of the arm. Color, in alcohol, above, dark purplish-brown, varied with black; below, interbrachial spaces the same; under surface of arms much lighter. Zanzibar.

#### NOTES ON THE CRETACEOUS AND CARBONIFEROUS ROCKS OF TEXAS. By JULES MARCOU.

A short time after my last return to Boston, June, 1860, I received two memoirs by Dr. B. F. Shumard, *On the Geology of Texas*, in which that eminent paleontologist has expressed opinions differing from those published by me several times from the year 1854 to 1859. From the nature of Dr. Shumard's memoirs, which contain only short notices, without descriptions or figures of the contested species of fossils, without geological maps, and without real sections of the rocks identified, I did not intend to give my views on the subject, especially after having repeatedly explained the stratigraphical relations of the rocks west of the Mississippi.

In the mean time I wrote a letter, in September, to Dr. Shumard, telling him that although his memoir *On the Cretaceous Strata of Texas* was very interesting, I could not agree with him as to the succession given by him in his theoretical section, but that I hoped one day we might meet, perhaps at Fort Washita, or even at Pyramid Mount, and then settle amicably together our different views. Dr. Shumard